WHAT IS THE MONTANA DIABETES PROJECT AND HOW CAN WE BE CONTACTED:

The Montana Diabetes Project is funded through a cooperative agreement with the Centers for Disease Control and Prevention, Division of Diabetes Translation (U32CCU815663-0). The mission of the Diabetes Project is to reduce the burden of diabetes and its complications among Montanans. Our web page can be accessed at http://ahec.msu.montana.edu/diabetes/default.htm.

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MONTANA DIABETES SURVEILLANCE & CLINICAL COMMUNICATION

MONTANA DIABETES PROJECT

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DIABETES IN YOUTH LESS THAN 20 YEARS OF AGE FROM INDIAN HEALTH SERVICE FACILITIES, MONTANA AND WYOMING 1997-1999.

WHAT'S INSIDE

BACKGROUND:

Until recently all diabetes in childhood was assumed to be the classic immune-mediated diabetes, now called type 1 diabetes. However, in the last several years there has been a growing recognition of type 2 diabetes in children and adolescents, particularly in minority populations.[1] Epidemiologic studies in Pima Indians showed the prevalence and incidence of type 2 diabetes in childhood is increasing.[2] Type 2 diabetes in childhood typically presents in overweight adolescents with a strong family history of diabetes. Acanthosis Nigricans, a skin condition associated with high insulin levels (i.e., due to insulin resistance), is often present at the time of diagnosis. Some of these children and adolescents may also present diabetic ketoacidosis. Among Pima Indian children aged <20 years, type 1 diabetes has not been recognized, while 5% of adolescents aged 15-19 years have type 2 diabetes in one study. The greatest risk factor for type 2 is exposure to maternal diabetes during pregnancy. Overweight/obesity is also an important determinant of the increasing prevalence.[3] In March 2000 the American Diabetes Association (ADA) and the American Academy of Pediatrics (AAP) published a joint consensus statement about type 2 diabetes in children and adolescents to help clinicians recognize and treat this form of diabetes in youth.[1,2]

Because of the high rates of type 2 diabetes in adult American Indians, it is important to establish surveillance for this form of diabetes in Indian youth.

As primary prevention efforts expand, ongoing surveillance will be needed to evaluate the incidence and prevalence of type 2 diabetes in Montana's Indian communities. In addition, little is known about the prevalence of type 2 diabetes in youth in the general population. Successful treatment strategies for diabetes in all children and adolescents will depend on the accurate recognition of the specific type of diabetes and the use of therapies directed at the underlying pathophysiology.

In 1999, the Montana Department of Public Health and Human Services (MT DPHHS) and the Billings Area Indian Health Service (IHS) established surveillance for all types of diabetes in youth less than 20 years of age who received care at IHS facilities in Montana and Wyoming from 1997-1999. This report summarizes the initial findings of the surveillance effort.

METHODS:

In order to establish baseline prevalence rates and to monitor trends in childhood diabetes all youth <20 years of age with an outpatient visit for diabetes were identified from the IHS data base in Montana and Wyoming from 1997-1999. The medical records of these youth were reviewed to verify a diagnosis of diabetes and to collect information regarding the clinical presentation and course of treatment. The medical records of mothers of confirmed cases were also reviewed to identify evidence of exposure to maternal diabetes prior to or during the case's gestation.

A youth with one or more of the characteristics in Table 1A was categorized as a case of type 1 diabetes, and a youth with one or more of the characteristics in Table 1B was categorized as a case of type 2 diabetes. Descriptive statistics were used for the data analyses. The prevalence (cases per 1,000) of diabetes overall and by type were calculated by age and sex. The denominator for these calculations was based on the user population for these IHS facilities in 1996 (N= 22,881 0-19 year olds).

RESULTS:

Fifty-two individuals less than 20 years of age were identified as having a confirmed diagnosis of diabetes. The median age at diagnosis was 11.6 years (range 1-16) and the median current age was 15.0 (range 2-19). Just over half of the cases were female (52%). The percent of Indian heritage among cases was: 12% full, 41% 1/4 to 3/4, 10% <1/4 and 37% unknown.

Based on the preliminary case definition, 25 cases (48%) were categorized as type 2 and 14 cases (27%) as type 1. Ten (19%) could not be categorized with the information available, and 3 (6%) had diabetes secondary to other conditions. Table 2 displays the frequency of documentation, and presence or absence of each characteristic. Of the ten uncategorized cases, seven had a normal weight for age (three had no documented information on weight), two had normal c-peptide and/or insulin levels (8 were not documented), and three had no family history of type 2 diabetes (seven had no documentation of family history).

TABLE 1. Case definitions used to categorize cases of diabetes in persons aged <20 years, Montana and Wyoming, 1997-1999.

A: Type 1 diabetes:
* Age ≤5 years at diagnosis * Weight per age ≤15th percentile at time of diagnosis * Positive islet cell antibody test less than a year after diagnosis
B: Type 2 diabetes:
* Weight/age ≥85th percentile at time of diagnosis (based on NHANES I and II data) * Acanthosis Nigricans noted on physical exam at or near the time of diagnosis * Elevated c-peptide or insulin level within a year of diagnosis * Family history of type 2 diabetes * Use of oral hypoglycemic agents with or without insulin or no current pharmacological treatment one year or more after diagnosis

UPCOMING EVENTS:

Diabetes - Getting to the Heart of Managing Care, May 19-20, 2000, Billings, Montana.
The goal of this two-day conference is to provide the latest information on diabetes care and research for physicians, pharmacists, nurses and other healthcare professionals. CME and CEU credits will be provided. A one-day conference for persons with diabetes and family members will take place on May 20, 2000. Key topics and faculty include:

* *Diabetes and Insulin Resistance* - Mary Ann Banerji, MD, SUNY Health Sciences Center at Brooklyn; Brooklyn, NY.

* *Management of Hyperglycemia in Type 2 Diabetes; Physical Activity and Diabetes* - Edward S. Horton, MD, Joslin Diabetes Center, Boston, MA.

* *Current Recommendations for Diabetes Screening* - Nancy Eyler, MD, Missoula, Montana.

* *Practical Clinical Approaches to using Insulin Effectively; A New Look at Cardiovascular Disease Risk Factors and Diabetes* - David Kendall, MD, International Diabetes Center, Minneapolis, MN.

* *Assessment and Treatment of Diabetic Nephropathy* - William F. Keane, MD, Hennepin County Medical Center, Minneapolis, MN

* *New Technologies for Diabetes Management* - Mary L. Johnson, RN, International Diabetes Center, Minneapolis, MN

For more information regarding the conference please call the Diabetes Project at (406) 444-6677.

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DIABETES RESOURCES AND EDUCATION:

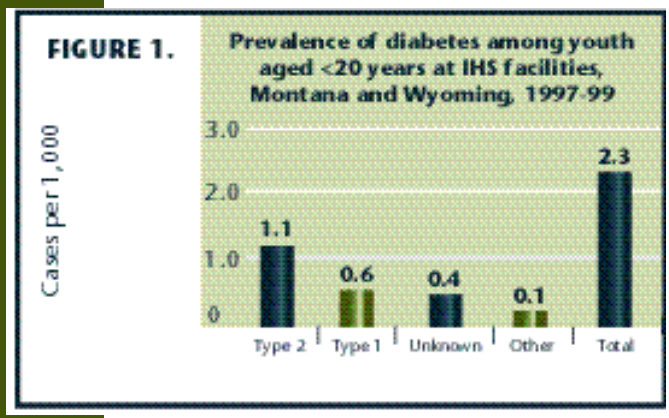
Acanthosis Nigricans brochures: The Montana Diabetes Project has adapted a health education brochure (developed by the Nebraska Diabetes Control Program) for patients and community members describing Acanthosis Nigricans. Copies can be obtained by calling the Diabetes Project at (406) 444-7073.

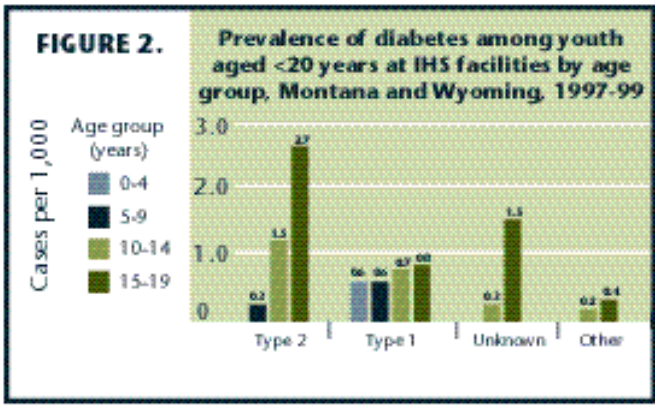
Protective footwear: Persons with diabetes are at high risk for foot complications. Therapeutic shoes, insoles and orthotics can help prevent foot complications. Both Montana Medicaid and the Medicare program cover these. For information on who is at risk and how to obtain a brochure on protective footwear for people with diabetes call (406) 444-7073.

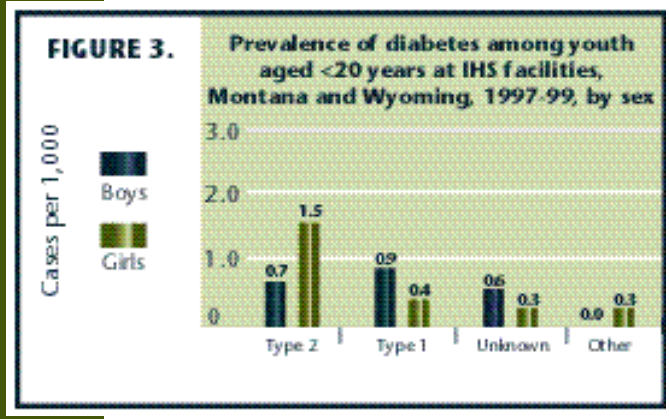
Want to improve your diabetes education skills or start a diabetes education program? The Quality Diabetes Education Initiative (QDEI) is a program sponsored by the Montana Diabetes Project offering resources to people wanting to improve and maintain their diabetes education skills. The “Guidelines for Mentoring Partnerships” program is a tailored program of self-study with the help of a mentor. There are three options in the mentoring process-beginner, intermediate, and advanced (steps to prepare for the CDE exam). The Diabetes Project has also created the “Montana Diabetes Resource Manual.” This is a guide to forming a diabetes education program in the outpatient setting. Please call us if you are interested or have questions: (406) 444-7073.

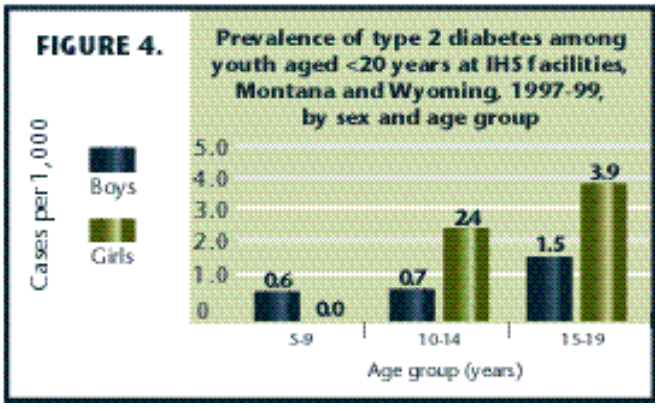
TABLE 2. Frequency of documentation, and presence or absence of each characteristic by type of diabetes, Montana and Wyoming, 1997-1999.			
	Type 2 (n=25)	Type 1 (n=14)	Unknown (n=10)
Documentation at dx/or in first year	No. with condition pres/abs (missing)	No. with condition pres/abs (missing)	No. with condition pres/abs (missing)
Age ≤=5 yrs	0/25 (0)	8/6 (0)	0/9 (1)
Pos. IC ab	0/11 (14)	2/0 (12)	0/0 (10)
Wt/age ≤=15%	0/22 (3)	4/5 (5)	0/7 (3)
Wt/age ≥=85%	21/1 (3)	0/9 (5)	0/7 (3)
Acan N noted	6/7 (12)	0/3 (11)	0/0 (10)
High c-pep/insulin	5/5 (15)	0/2 (12)	0/2 (8)
Fm Hx type 2	11/6 (8)	1/5 (8)	0/3 (7)
Insulin only >1 yr after dx	9/16 (0)	12/1 (1)	10/0 (0)

Based on population estimates of youth served by IHS, the prevalence estimates by type of diabetes were calculated (Figure 1). Overall, the prevalence of type 2 diabetes was approximately two-fold higher than the prevalence of type 1 diabetes. The prevalence of type 2 diabetes increased with age, while the prevalence of type 1 diabetes remained relatively constant by age category (Figure 2). Type 2 diabetes was more common among girls than boys (Figure 3). The prevalence of type 2 diabetes increased with age among both girls and boys (Figure 4). Prenatal records were available for 27 of the 52 cases. Exposure to maternal diabetes during pregnancy was documented in 11% (3/27) of youth, all of whom were classified as having type 2 diabetes.









LIMITATIONS:

There are a number of limitations to these analyses. There may be youth with diabetes that are undiagnosed and therefore not included in the prevalence estimates. Also, youth with type 2 diabetes may be more likely to be undiagnosed compared with youth with type 1 diabetes. Thus, our estimates may be lower than the true rate of diabetes in youth, particularly among youth with undiagnosed type 2 diabetes. Only youth actually receiving IHS services are included in the analyses. Indian youth living off the reservation who receive services from solely non-IHS providers would not be included in this assessment, but would be included in the denominator. This would also be true for youth from reservations where private physicians provide primary care services. Youth with diagnosed diabetes who did not have a visit during the three year time period (1997-1999) are not included in these estimates.

The population estimates were calculated using the 1996 IHS user population as the denominator. The population estimate includes registered IHS users who live both on and off of the reservations. The completeness of data collection from the medical records was also a limitation in that not all of the pertinent data was available for each case and for their mother. Finally, the preliminary case definition described above has not been field tested in other settings and further study is needed to validate the case definition. It is also possible that children with type 1 diabetes are overweight (≥85th percentile weight per age) due to the general increase in weight among U.S. children and adolescents.

CONCLUSIONS:

Based on the preliminary case definition, type 2 diabetes was the predominant form of diabetes in youth <20 years of age receiving care at IHS facilities in Montana and Wyoming (48%). This estimated prevalence of type 2 is consistent with the few other studies in Indian communities as well as other selected communities in the United States and Canada. Studies of First Nations youth in Canada report prevalence ranging from 1.7 to 2.5 per 1,000.[4] Among Pima Indians, where children aged five years and older are actively screened for diabetes, the prevalence of type 2 diabetes is considerably higher and has increased significantly from 1967-1976 to 1987-1996.[3] Type 2 diabetes has increased from 24 to 53 cases per 1,000 among Pima boys aged 15-19 years (up 58%) over this time period and from 27 to 53 cases per 1,000 among girls (up 96%). Similarly, the prevalence of diabetes among youth aged 15-19 years receiving services from all IHS service areas increased 54%, from 2.9 to 4.5 per 1,000 between 1988 and 1996.[6] Risk factors associated with type 2 diabetes in children from these and other studies included overweight/obesity, family history of type 2 diabetes, acanthosis nigricans, and in-utero exposure to diabetes.[3] The prevalence of type 1 diabetes among these youth (0.6 per 1,000) was lower than national estimates of 1.7 per 1,000.[6]

Surveillance for type 2 diabetes is important to monitor trends in the prevalence of diabetes over time and to evaluate prevention efforts. The preliminary surveillance definition described in this report may be useful to monitor trends in diabetes among Indian youth in IHS facilities and both Indian and non-Indian youth in other primary care settings. Further work is needed to validate and refine the surveillance definition. Nationally, the prevalence of diabetes is increasing among adults, and this increase is strongly related to the increase of overweight and obesity and sedentary lifestyle. Similar trends may be underway in youth, and may lead to an increase in the morbidity and mortality due to diabetes and its complications in the young adult population.

The ADA and AAP joint consensus statement addresses several issues related to type 2 diabetes in childhood.[1] Recommended criteria for the diagnosis of diabetes in childhood were similar to those recommended for adults as shown in table 3.[7] The consensus panel identified recommendations for screening for type 2 diabetes in children and adolescents with specific risk factors as shown in table 4.

TABLE 3. Criteria for the diagnosis of diabetes among adults, adolescents and children.*
Symptoms of diabetes such as polyuria, polydipsia, and unexplained weight loss AND a random glucose concentration >=200 mg/dl (11.1 mmol/l).
Fasting plasma glucose >=126 mg/dl (7.0 mmol/l). Fasting is defined as no caloric intake for at least 8 hours.
2-hour plasma glucose >=200 mg/dl during a oral glucose tolerance test (OGTT) using a glucose load containing the equivalent of 75-g anhydrous glucose dissolved in water.+

*Adapted from the Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus (7). These criteria should be confirmed by repeat testing on a different day. +OGTT is not recommended for routine clinical use.

TABLE 4. Screening for type 2 diabetes in children and adolescents.*
Testing for type 2 diabetes is recommended for children and adolescents who are:
Overweight defined as BMI >85th percentile for age and sex, or weight for height >85th percentile, or weight >120% of ideal weight
and have any 2 of the following risk factors:
Family history of type 2 diabetes in first or second degree relatives
Race/ethnicity - American Indians, African Americans, Hispanic Americans, Asians and South Pacific Islanders
Signs or conditions associated with insulin resistance such as acanthosis nigricans, hypertension, dyslipidemia, polycystic ovarian syndrome)

*Adapted from (1)

The consensus statement emphasizes the importance of metabolic control as well as control of other risk factors to prevent the long-term complications of diabetes. Additionally, the consensus statement provides recommendations for treatment and primary prevention among youth.

This report summarizes preliminary efforts to define the burden of diabetes in youth in Montana's Indian community and to develop surveillance definitions to distinguish the forms of diabetes in childhood and adolescence. Montana DPHHS, in collaboration with the Billings Area IHS, are planning to refine and continue this surveillance effort. In addition, the DPHHS is exploring the possibility of expanding the surveillance effort statewide in Montana.

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